

LE CENTRE DE RÉANIMATION RESPIRATOIRE DE L'HÔPITAL CLAUDE-BERNARD, PARIS

P. MOLLARET, M.D.

Professeur de Clinique à la Faculté de Médecine de Paris

J. J. POCIDALO, M.D.

*Chef de Laboratoire à la Faculté de Médecine, Maître de Recherches à l'Institut National d'Hygiène
Hôpital Claude-Bernard, Paris 19e*

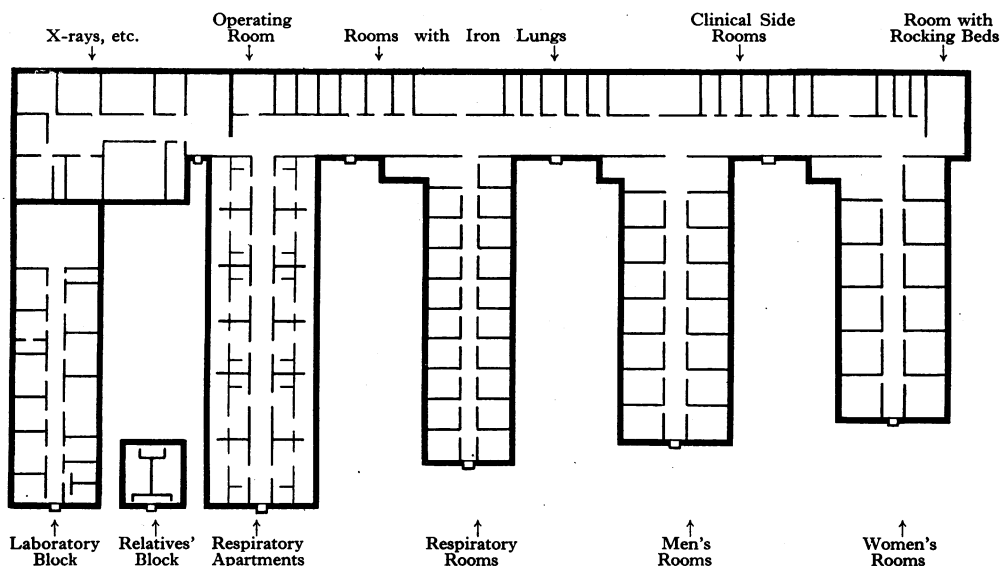


FIG. 1.—Respiratory Unit.

The creation of the *Centre de Réanimation respiratoire* at the Claude-Bernard Hospital goes back to 1954, after the 1952 Danish epidemic of poliomyelitis had proved two things: that cases of respiratory poliomyelitis must be brought to a special centre and that many of them could be saved, not by an iron lung, but by respirators using the endotracheal route.

L'Assistance Publique de Paris financed the equipping and continued functioning of this centre for cases of poliomyelitis. However, as this disease has a seasonal incidence, demands on the centre might have been intermittent; its scope was therefore increased so that any case of respiratory failure could be given the special treatment required. The centre has therefore been transformed to a *Centre de Réanimation respiratoire* which has been able to save the lives of many patients who could not be treated in the many medical services which could not carry out prolonged artificial respiration.

Organization

It must be realized that old, existing buildings have been used for this purpose, only interior adaptations being made with a minimum of expense. The following plan is not, therefore, the one which would have been followed if we had been fortunate enough to be able to build anew.

In the plan (Fig. 1) the unit is seen to be aligned on each side of a straight corridor. From one side of this open single respiratory rooms (eight having iron lungs), clinical side-rooms and offices for doctors and nurses. On the other side, leading off at right-angles, are five large buildings, each with its own central corridor. The first two are reserved for patients not requiring artificial respiration, usually those under observation or those convalescing after treatment which had necessitated tracheostomy. One has 11 rooms for women; the other 14 for men. Two other buildings are given over to respiratory rooms, equipped with

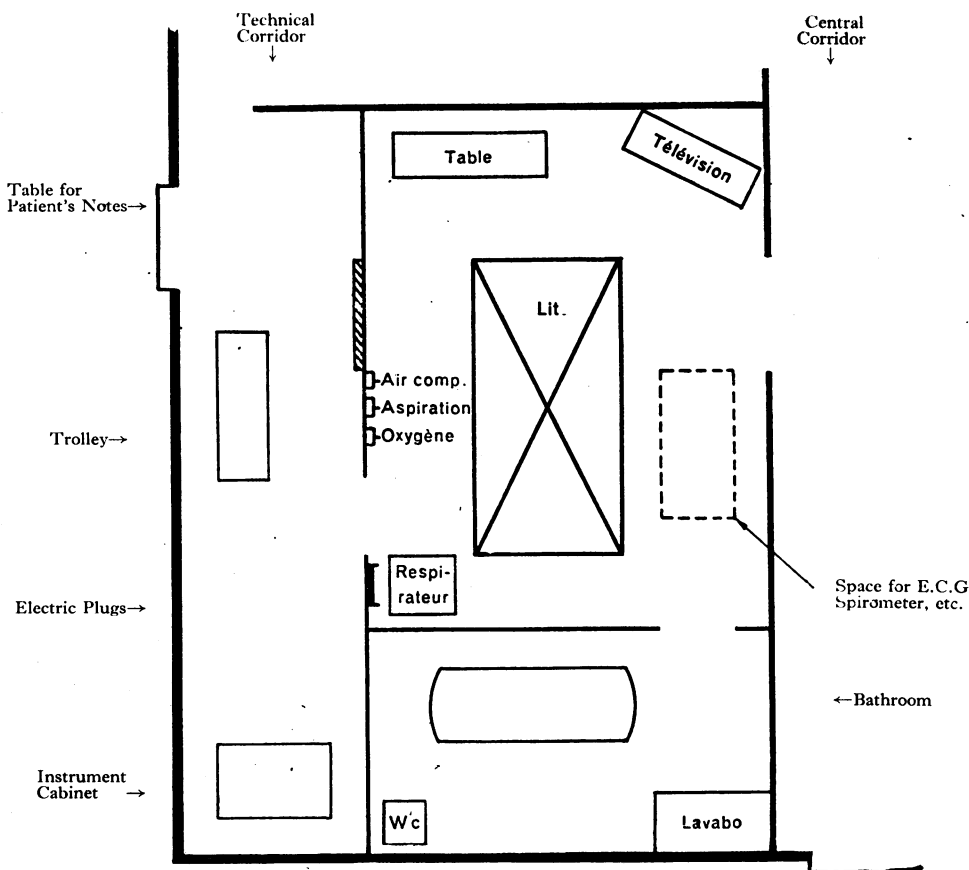


FIG. 2.—A respiratory 'apartement.'

respirators. The first consists of 12 respiratory 'apartments', the general layout of each being shown in Fig. 2. Each consists of three rooms, one having a special bed, a table and a respirator, with points for compressed air, oxygen, suction and electric power. One room is a bathroom and the other is a section of the 'technical corridor' with an instrument container, a trolley and a large table for all the patient's notes and charts. The second building consists of single rooms, each with respirator and gas supply, for chronic cases.

Technical Services

Laboratories. These fulfil two functions: that of control of the individual patient and that of investigation of the different cardiovascular and respiratory problems that arise. For the first, blood gas tensions, electrolytes and pH are studied. The research work is financed by *l'Institut National d'Hygiène (Organisme de Recherche Médicale du Ministère de la Santé Publique)*, which maintains a unit for respiratory research. Thanks to this unit, directed by Professor Brignard, a

number of research workers and technicians are regularly employed and available.

Radiology, etc. Fig. 1 shows how the main corridor leads into this department, which is directed by Dr. Cherigie. All related investigations can be done here: cine-radiography, E.E.G.s and E.C.G.s. Facilities for portable X-rays and E.E.G.s are available.

Oto-rhino-laryngology. This speciality holds a leading place among the ancillary services and a complete unit, directed by Dr. P. Aboulker, occupies a neighbouring block. Tracheostomies are done either by an E.N.T. specialist on duty or, in an emergency, by the duty surgeon. This operating room will be noted in Fig. 1; it is arranged so that the major step in treatment, tracheostomy, can be done in the least possible time.

Arrangements for Gas Supply. These are in the basement. Large containers are filled with 50% oxygen, which is fed directly into every room, so that none need contain any cylinders. Compressed

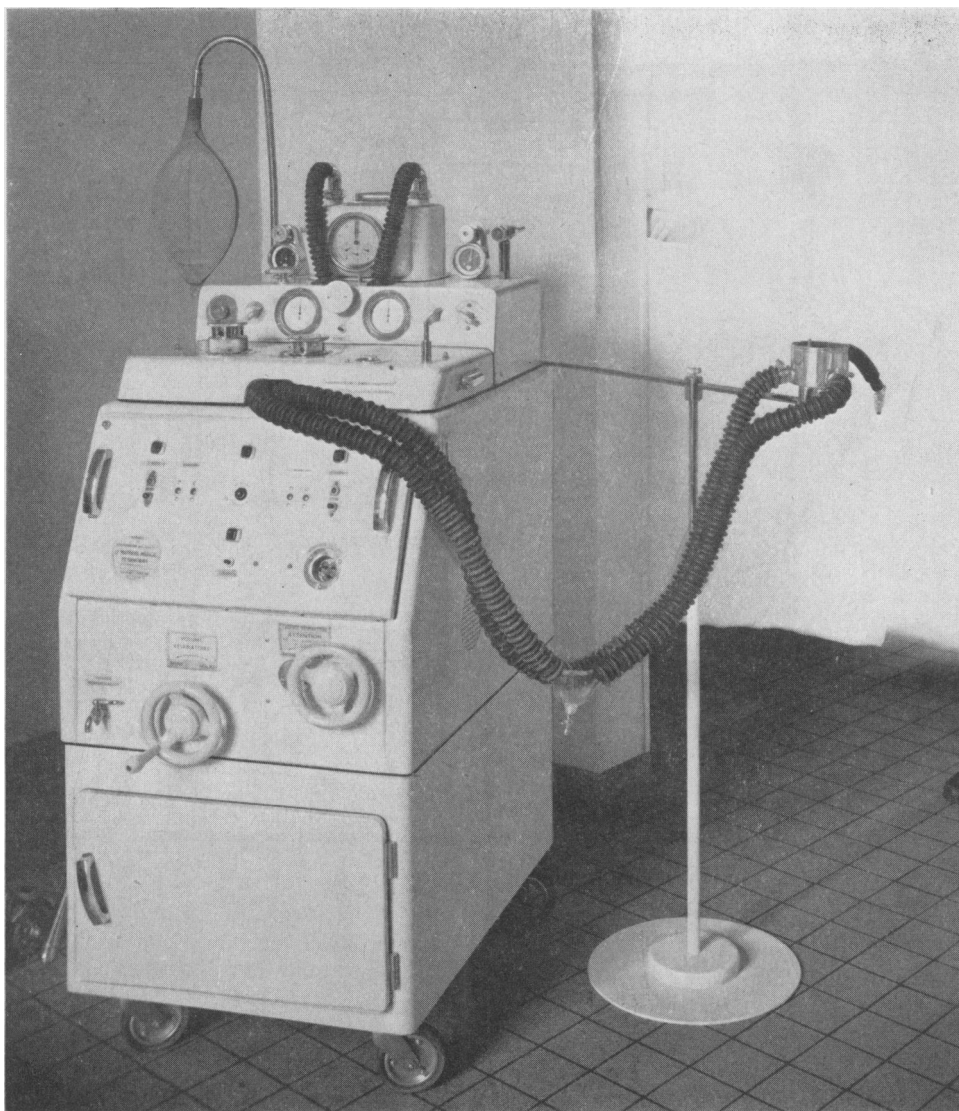


FIG. 3.—Claude-Bernard respirator

air and suction are also laid on in every room, permitting the use of standard equipment.

Safety Precautions. A generator comes into operation in the event of a short-circuit or other electrical failure. A duty mechanic is available in the event of any mechanical breakdown.

The Respirators. The number of these available is obviously as important as the number of beds. Two main types are in use:

(1) *External Type*

(a) There are seven *iron lungs*, one being a special type for infants and children. These are used almost solely for 'dry' forms of respiratory

poliomyelitis, other conditions seldom being an indication for them.

(b) *Cuirasses*, 10 in number. These are used essentially for the treatment of chronic respiratory failure after poliomyelitis.

(c) *Rocking beds*, three in number. Used for muscular re-education, particularly of the diaphragm.

(2) *Internal Type*

These are used whenever a tracheostomy is necessary. Many different types have been tried and we now have the following: 13 Engström respirators, two of the Claude-Bernard type,

28 Bary machines, six R.P.R. respirators and seven others. Those needed for the acute phase must be distinguished from those required for chronic respiratory failure. The Engström and Claude-Bernard machines belong to the first type. While our chief experience has been with the Engström, our best results are now obtained with the Claude-Bernard (Fig. 3), for which the pressure curves are ideal and superior to those obtained from the Engström.

The Bary respirator, which is reasonably priced, is used for chronic respiratory failure after poliomyelitis. The R.P.R. machine is particularly valuable during the transport of patients, as it is independent of any electrical supply.

Medical and Nursing Staff

Needless to say, the standard required is higher than the usual one.

The nurses keep the usual eight-hourly duty periods, but many more than the usual number are needed. For the respiratory rooms, two nurses and an assistant are required for each period for six patients. In the chronic wards one nurse and one assistant are needed for six patients.

Seven physiotherapists look after patients who have to remain some time before they can be transferred to the Rehabilitation Centre (Hôpital des Garches, Service du Dr. Grossiord).

The medical teams are made up of *externes titulaires des Hôpitaux de Paris*, whose position is exceptional in that they are volunteers, attached only to this hospital, working six-hour shifts and rewarded with good salaries and a careful attention to their periods of day and night duty by the administration. They serve under the general direction of four assistants (Drs. Goulon, Damoiseau, Rapin and Lissac), to whom credit belongs for having initiated them, night and day, into many aspects of respiratory failure.

Cases Treated

From the end of 1954 to the beginning of 1959, 1,253 cases were treated (Mollaret, Bastin, Goulon, Rapin, Lissac and Pocidalo, 1959), made up as follows:

(1) *Infections of the Nervous System*

(a) Acute anterior poliomyelitis: 335 (172 of the respiratory form, of which there were 35 with a supramedullary onset).

(b) Guillain - Barré syndrome (polyradiculoneuritis with albumino-cytologic dissociation in the C.S.F.): 64 cases, of which 34 had tracheostomy performed, among them 28 submitted to artificial respiration.

(c) Polyneuritis: 18 cases, of which 13 took a respiratory form.

(d) Affections of the brain-stem: 25 cases,

consisting of 15 with cord trauma, six with hæmatomyelia and four with meningo-myelitis.

(e) Cerebral and cerebro-medullary disturbances: 48 cases. Twenty-six were cases of coma with complete suppression of respiratory function and apnoea requiring artificial respiration, eight cases were of vascular origin, five were of virus poliomyelitis, seven were various neuro-surgical conditions.

(f) Tumours of brain-stem and syringobulbia.

(2) *Various Paralyzes*

(a) Myasthenia gravis: eight cases.

(b) Hyperkalæmia, one; hypokalæmia, two.

(c) Acute intermittent porphyria: five cases, all presenting with respiratory insufficiency.

(3) *Tetanus*

Acute or subacute respiratory insufficiency, together with cardiac syncope, are the principal causes of death, so it is not surprising that we have had to treat the most severe forms of the disease, which may need curarization and artificial respiration. During this period we treated 36 men and 69 women, 46 being curarized.

(4) *Various Infections*

(a) Diphtheritic paralysis: seven cases.

(b) Influenza: seven cases.

(5) *Intoxications*

The treatment of these is an important part of the work of a respiratory centre. Seventy-eight cases of barbiturate poisoning were treated (22 by tracheostomy), 17 of carbon dioxide narcosis and six of trichlorethylene poisoning.

(6) *Respiratory Insufficiency of Pulmonary Origin*

Chronic broncho-pulmonary affections with emphysema. Of 24 hospitalized cases of emphysema, 15 had to be treated by artificial respiration. (Up to the present moment we have treated more than 100 cases of emphysema, 35 by artificial respiration.)

Conclusions

All these conditions have one feature in common: that of life-threatening respiratory insufficiency. The centralization of the treatment of such patients can only be advantageous, for it makes the best use of the techniques of resuscitation, which can be applied to a large number of patients, while the maximum use can be made of machines and manpower, at the same time keeping the cost to a minimum. These concepts have been so far accepted that a number of important centres have been set up in large towns in France. We may mention the one at *l'Hôpital des Enfants Malades* in Paris, directed by Prof.-agregé Thieffry, which takes children, while we accept responsibility for adults. Lyon, Bordeaux, Toulouse, Strasbourg, Lille, Rouen, Marseilles, Clermont-Ferrand and Rennes have centres modelled on that of Paris.

One other fact must be finally emphasized: an effort must be made to organize the transport of these cases. Once given centralization, it was essential to form teams to accompany patients from the hospitals to the centres (which might be one or even two hundred kilometres away). *L'Assistance Publique de Paris* has provided many specially equipped ambulances (each with aspirator, oxygen, cuirass and R.P.R. respirator) which can be sent to convey patients with respiratory failure under the supervision of a specially experienced doctor. This has proved a particularly happy arrangement, for patients sent in this way are given the best chance

to benefit from the specialized treatment provided at the centre.

Summary

(1) The organization of the *Centre de Réanimation respiratoire* is outlined.

(2) The type of respirator used and the staffing are described.

(3) An analysis is made of the cases treated in 1955-59.

Acknowledgment

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REFERENCE

MOLLARET, P., BASTIN, R., GOULON, M., RAPIN, M., LISSAC, J., and POCIDALO, J. J. (1959): *Le Traitement de l'Insuffisance Respiratoire Aigue*, Report of the 32nd Congress of Medicine, Lausanne. Paris: Mame.
